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Classes of Disruptive Behavior Problems in Referred Adolescents

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Key Words

Attention problems · Behavior problems · Aggression · Disruptive behavior taxonomy, adolescents

Abstract

Background: Previous studies have found considerable overlap between attention/hyperactivity problems, aggressive/oppositional problems and delinquent/conduct problems in adolescents. **Sampling and Methods:** Mothers of 1,965 11- to 18-year-olds (1,116 boys, 849 girls), referred to mental health agencies, completed the Child Behavior Checklist (CBCL). Latent class analysis was conducted on the Attention Problems scale (representing problems with attention, impulsivity and hyperactivity), Aggressive Behavior and Rule-Breaking Behavior scales of the CBCL. **Results:** Six latent classes were found. One of these classes contained individuals who suffered predominantly from attention problems and to a far lesser degree from aggressive or rule-breaking behaviors. The other 5 classes represented individuals with varying degrees of attention problems, aggressive behaviors and rule-breaking behaviors. **Conclusions:** Contrary to previous studies, the present study indicated that, in a large referred sample, problems with attention, impulsivity and hyperactivity can be considered as a diagnostic construct that should be distinguished from aggressive or rule-breaking behaviors. However, the present study did not support the existence of diagnostic classes constituted by

individuals who primarily suffer from aggressive behaviors or rule-breaking behaviors, and not from attention problems or hyperactivity. Implications of these findings for future research and clinical practice are discussed. The value of the study was limited by the use of parent reports only.

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Introduction

To facilitate and enhance research regarding the etiology, prognosis and treatment of psychiatric disorders in children and adolescents, development and improvement of taxonomic systems is needed. The taxonomy of disruptive behaviors in children and adolescents generally contains 3 problem domains: attention/hyperactivity problems, aggressive/oppositional problems and delinquent/conduct problems [1–6]. These 3 problem areas can be observed in the DSM system (attention-deficit/hyperactivity disorder, ADHD; oppositional defiant disorder, ODD; conduct disorder, CD), which is a categorical system that was based on consensus among experts on the criteria that should be used to describe disorders [1–3]. However, the empirically based taxonomic system that was developed by Achenbach and colleagues [4–6] contains a similar division in diagnostic areas (attention problems, aggressive behavior, rule-breaking behavior). Moreover, empirical evidence is available that the taxono-

nomic constructs of the DSM and those developed by Achenbach, despite the considerable difference in the way they were developed, converge strongly. This supports their construct validity [7–15].

Many studies found high comorbidity rates between the three areas of disruptive behavior problems [16–19]. Further, individuals with different types of disruptive behavior appeared to be very similar with regard to deficiencies in problem-solving skills, pervasiveness of problems across different situations, intelligence and achievement measures, family context measures and behavioral symptoms [20, 21]. Other authors used factor analysis to investigate the structure of disruptive behavior problems. Some studies found evidence for separate dimensions of attention/hyperactivity problems, aggressive/oppositional problems and delinquent/conduct problems [4–6, 22, 23], whereas others did not [24]. These findings, at least, indicated that it can be questioned whether distinctions between 3 different subtypes of disruptive behaviors should really be made.

To study taxonomy, it is important to investigate which homogeneous groups of individuals can be discerned, according to the presence or absence of symptoms. Such homogeneous groups might need similar treatments or share a common etiology. To shed light on such homogeneous groups, many studies have used factor analysis. However, factor analysis informs us to which extent symptoms group together but is not informative on homogeneous groups of individuals. For instance, although factor analysis may yield a factor solution indicating 3 factors, e.g. attention problems, aggressive behavior and rule-breaking behavior, it does not indicate whether distinguishing a group of individuals with high levels of attention problems, and simultaneously low levels of aggressive and rule-breaking behaviors, is a useful way to constitute diagnostic subgroups, or whether such groups exist or not. To analyze which homogeneous subgroups of individuals that are as different as possible from other groups exist, latent class analysis (LCA) is more useful [25].

Previous studies [26, 27] used LCA to identify groups of children with different profiles of disruptive behavior, but failed to find classes of children with attention deficit/hyperactivity, oppositional defiant or conduct problems only. Instead, different types of disruptive behaviors tended to co-occur. Other studies, though, found that different disruptive behavior domains occurred separately. For instance, a study that concerned LCA on DSM-IV attention/hyperactivity and oppositional symptoms derived from adolescent and parent ratings on the Semi-

Structured Assessment for the Genetics of Alcoholism [28] revealed 3 attention/hyperactivity problem categories, as well as 2 clinically relevant oppositional problem classes [29].

Previous studies that applied LCA used samples from the general population or with very young children, which contained a relatively small number of individuals with elevated problem levels [26, 27, 29, 30, 31]. This may have influenced the results. In large referred samples, classes of individuals with ‘pure’ attention/hyperactivity, oppositional or conduct problems might still be present and might be detected with LCA.

The aim of the present study was to investigate latent classes of disruptive behavior problems in referred adolescents and to investigate whether these classes are in accordance with separate taxonomic entities or with high levels of comorbidity.

Methods

Participants

The sample consisted of 1,965 11- to 18-year-olds (mean age = 13.2 years; 1,116 boys, 849 girls). All participants were referred consecutively to the outpatients’ department of child and adolescent psychiatry of the University Hospital Rotterdam/Sophia Children’s Hospital ($n = 1,582$) or to a community mental health center in Rotterdam ($n = 383$), between March 1982 and August 2003. The use of data from a university clinic and a community mental health clinic has probably reduced the effects of referral bias by yielding a sample of adolescents with a broad range of problems and a wide variety of problem levels. Because mothers may rate their children’s behavior differently from fathers [28], only data obtained from mothers and not from fathers were used.

Materials

Child Behavior Checklist. The Child Behavior Checklist (CBCL) is a parent questionnaire for assessing problems in children and adolescents. The first version [4] was developed for 4- to 16-year-olds. It contains 120 items on behavioral or emotional problems in the past 6 months. The response format is 0 = not true, 1 = somewhat or sometimes true and 2 = very true or often true. A second version of the CBCL, for ages from 4 to 18 years, was developed in 1991 [5], and a third version, for ages from 6 to 18 years, in 2001 [6].

In the present study, the scales Attention Problems, Aggressive Behavior and Rule-Breaking Behavior of the CBCL were used. In version 3, 2 items were added to the Attention Problems scale: item 4, ‘Fails to finish things he/she starts’, and item 78, ‘Inattentive or easily distracted’. Four Rule-Breaking Behavior items were added as well in version 3: item 2, ‘Drinks alcohol without parents’ approval’, item 28, ‘Breaks rules at home, school or elsewhere’, item 99, ‘Smokes, chews or sniffs tobacco’, and item 105, ‘Uses drugs for nonmedical purposes’. These items were not included in the analyses, because they were not contained by the first 2 versions of the CBCL. The good reliability and validity of the Amer-

ican version of the CBCL [2–4] were confirmed for the Dutch translation [24, 32–34].

To investigate the fit of the Attention Problems, Aggressive Behavior and Rule-Breaking Behavior scales in this Dutch clinical sample, we performed a confirmatory factor analysis. The 39 CBCL Attention Problems, Aggressive and Rule-Breaking Behavior items that were analyzed with confirmatory factor analysis – except item 73, ‘Sexual problems’, and item 101, ‘Truancy, skips school’ – had a factor loading of at least 0.3 and could therefore be considered to be representative of the scale they were assigned to. Therefore, items 73 and 101 were not used in the LCA. The confirmatory factor analysis model fitted the data: root mean square error of approximation = 0.08; Tucker-Lewis index = 0.95.

Data Analysis

Thirty-seven items of the Attention Problems, Aggressive Behavior and Rule-Breaking Behavior scales were used to conduct LCA with Mplus version 3.0 [35]. LCA adds classes until the model does not improve further. To identify the lowest number of classes that fitted the data well the Bayesian Information Criterion (BIC) [36] was used. To control for age and gender, dichotomous variables indicating higher age (15–18 years) and female gender were included as covariates [37–39].

To compare internalizing comorbidity levels in the different disruptive behavior problem classes, an ANOVA was performed for the total Internalizing Problem score. The total Internalizing Problem score is the sum of the CBCL scales Anxious/Depressed, Withdrawn/Depressed and Somatic Complaints. After the ANOVA, post hoc tests were performed, using Gabriel’s procedure [40].

Results

A 2-class model LCA on Attention Problems, Aggressive and Rule-Breaking Behavior items yielded a BIC value of 110,751. Going from a 2-class to a 3-class solution resulted in a BIC drop of 3,142 points, which means that adding a third class improved the model. BIC values indicated that a 6-class solution fitted the data best; going from 3 to 4 classes resulted in a BIC drop of 738 points, going from 4 to 5 classes resulted in a BIC drop of 411 points, whereas going from 5 to 6 classes resulted in a BIC drop of 214 points. A 7-class model did not yield a stable solution. The numbers of adolescents in each of the 6 classes, as well as their sex distribution, are shown in table 1.

LCA yields item score probabilities for individuals for all items that are included in an analysis. These probabilities are different for each class and indicate the probabilities of item scores 0, 1 and 2, given a specific class membership.

Theoretically, for each class, the probabilities of score 0, 1 and 2 for each item can be put into a graph. To enhance the comprehensibility of our graph and because of

Table 1. Numbers and sex distribution for each class

Class	Number ¹	Boys ²	Girls ³
1	278 (14)	225 (20)	53 (6)
2	148 (8)	96 (9)	52 (6)
3	245 (12)	90 (8)	155 (18)
4	261 (13)	222 (20)	39 (5)
5	497 (25)	284 (25)	213 (25)
6	536 (27)	199 (18)	37 (40)

Figures in parentheses indicate percentages.

¹ Percentages in this column represent the class members as part of the total sample.

² Percentages in this column represent the boys in the class as part of the total number of boys.

³ Percentages in this column represent the girls in the class as part of the total number of girls.

the purpose of this study to focus on the clinically relevant levels of problems, we chose to only present data regarding probabilities of score 2 on items in a graph and to present mean item endorsement probabilities for score 2, separately for the 3 domains (Attention Problems, Aggressive Behavior and Rule-Breaking Behavior) that were studied. Hence, for instance, figure 1 shows that the mean probability of score 2 on Attention Problem items was around 0.5 for individuals in class 1, and smaller than 0.1 for members of class 5.

Figure 1 shows that individuals in classes 1, 3 and 5 displayed attention problems, aggressive behavior as well as rule-breaking behavior, and that they did not have a higher score on one domain than on the other two behavior clusters. Individuals in class 2 predominantly showed attention problems and lower levels of aggressive/rule-breaking behavior. Individuals in class 4 had mild attention problems, but low aggressive/rule-breaking behavior. Class 6 was a normative class, with low levels of disruptive behavior problems.

ANOVA showed differences between the classes on the total Internalizing Problem score, with $F(5; 1,959) = 57.52$, $p < 0.001$. Post hoc tests, performed using Gabriel’s procedure ($\alpha = 0.05$), showed that individuals in class 1 had significantly higher levels of internalizing problems than individuals in classes 2, 4, 5 and 6. Individuals in class 3 had significantly higher internalizing problem levels than individuals in all the other classes. Internalizing problem levels were significantly higher in classes 2, 4 and 5 than in class 6.

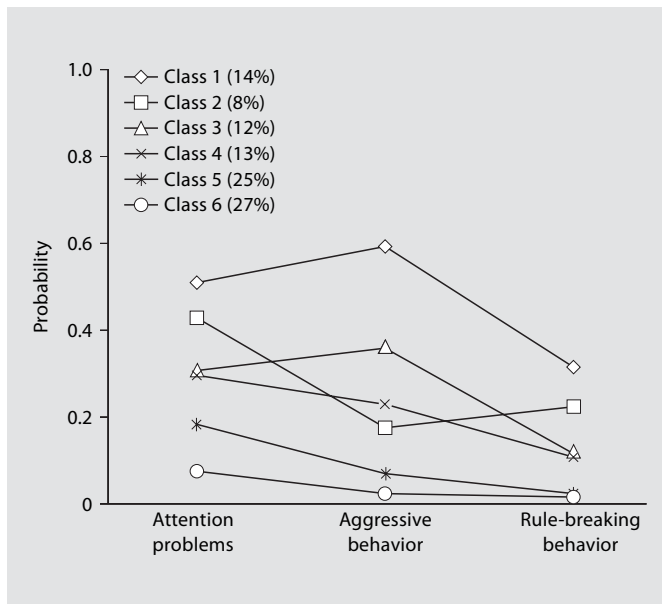


Fig. 1. Mean probabilities of item score 2 on attention problems, aggressive behavior and rule-breaking behavior.

Discussion

This study investigated latent classes of disruptive behavior problems in a large referred sample of adolescents. The strengths of the study included the large sample size, which enhanced the power of the study to detect latent classes. Second, referred adolescents were studied, who had relatively high percentages of positive scores on behavior problem items. In a referred sample, clinically significant classes with a low prevalence in the general population have a higher chance to be detected. Third, contrary to previous samples that were studied, the sample included a large proportion of females. Further, previous investigations that examined comorbidity patterns of disruptive behavior problems often used categorical DSM-IV diagnoses of ADHD, ODD and CD [17]. Use of categorical information results in a loss of possibly important statistical information about subthreshold symptoms. As a consequence, an individual may be regarded as a 'pure' case of, for instance, oppositional disorder, even if a considerable number of ADHD or CD symptoms are present. The present study took account of all available statistical information.

LCA revealed 6 homogeneous classes of individuals. Five of the 6 lines in figure 1 run parallel. This indicates that the classes (classes 1, 3, 4, 5 and 6) represented by

these lines contained individuals with different levels of disruptive behavior problems, but not with differences concerning the type of problems. In other words, the lowest line represented a class of individuals with low levels of attention problems, aggressive behaviors and rule-breaking behaviors, and higher lines represented individuals with higher levels of all these 3 types of problems. Many previous studies found evidence for high comorbidity rates of different types of behavior problems [16, 17, 20, 21, 24, 26, 27]. Hence, the finding that 5 of the 6 lines ran parallel, indicating high levels of comorbidity rates at each level of problems, was not surprising.

One line represented individuals with high levels of attention problems and far lower levels of aggressive and rule-breaking behaviors (class 2). Hence, 2 groups of individuals with high levels of attention problems were identified: one group with high levels of aggressive behaviors and rule-breaking behaviors as well, and another group with lower rates of comorbid aggressive and rule-breaking behaviors. This finding contrasted with previous studies that used LCA that did not provide evidence for these 2 different classes of individuals with high levels of attention problems [26, 27]. This may be due to the fact that previous studies used general population samples that contained a relatively small number of individuals with high problem levels, which may have resulted in the insufficient ability to discriminate between different classes with high problem levels. Instead, all individuals with high problem levels were apparently grouped in one single high problem level class.

The findings indicated that referred adolescents with high levels of attention problems can be divided into a group with high and a group with lower comorbid aggressive and rule-breaking behaviors. Although our findings need to be replicated in independent clinical populations, these 2 groups might have a different etiological background, and probably require different types of treatments. This is in accordance with studies indicating that genes exist that are specifically responsible for ADHD but not for ODD/CD, or vice versa [41, 42]. For instance, Nadder et al. [41] found that one common genetic factor determined covariation between different disruptive behavior phenotypes, but that additional genetic factors were specific for ODD/CD symptoms.

A class with high levels of aggressive and rule-breaking behaviors and low levels of attention problems was not detected. This may be due to a referral bias, since it may be the case that those with such symptom profiles are less likely to be admitted to mental health agencies.

Therefore, our data reflect the taxonomy of disruptive behavior in those who were referred to mental health services. A similar study in delinquent adolescents could lead to different results. To investigate whether classes with pure aggressive or rule-breaking behaviors are really nonexistent, it is important to investigate symptom profiles of incarcerated youths. In such youths, rates of DSM-IV ADHD have been reported to be low [43].

Comparison of internalizing comorbidity levels for the different disruptive behavior problem classes showed that, generally, classes with higher levels of disruptive behavior also had higher levels of internalizing behavior. We found 1 class, class 3, that had high scores both on disruptive and internalizing behavior. This means that a large group of clinically referred children had high scores on a broad range of problem behaviors. This could mean that specific therapeutic programs targeted at this group are needed.

The value of the present study was limited by the use of parent reports only. It is known that parents often disagree with other informants – the adolescents themselves, teachers – about the presence or absence of disruptive behaviors [44, 45]. Future studies that make use of information from other informants as well may provide valuable additional information regarding latent classes of disruptive behaviors in adolescents.

The results of the present study underscored the necessity of studying clinically relevant taxonomic constructs in a referred sample. Class solutions in the present study were markedly different from those for general population samples. Further, the disadvantage of studies that only used categorical diagnoses to assess associations between different subtypes of behavior problems was demonstrated by the finding that, despite high comorbidity rates, LCA detected 2 subgroups of attention deficit individuals: one with high and another with lower comorbid aggressive or rule-breaking behaviors.

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